

Name/Per: _____

Algebra 2
Statistic and Probability

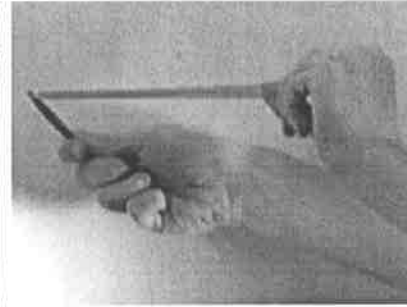
Targets	Learning Targets	Got it	Ok	No way
T Stat-1	I can find the mean, median, mode, and 5-number summary of a set of data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T Stat-2	I can create and interpret a box plot given a set of data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T Stat-3	I can find and interpret the standard deviation of a set of data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Date	Lesson/Activity	Homework Assignment o = only do odd problems	Turned In?
T Stat-1	Stat 1 Mean, Median, Mode	Stat 1 Worksheet	
T Stat-2	Stat 2 Box Plot	Stat 2 Worksheet	
T Stat-3	Stat 3 Standard Deviation	Stat 3 Worksheet	
	Statistic Test	Rubber Band Launch Worksheet **Chapter Test for those unable to handle activity**	

Retake Problems for Ch. 7

T 7-1	I can describe transformations, domain and range, and graph exponential and logarithmic functions.	T 7-1 Retake Worksheet Graphing Logarithmic and Exponential Equations
T 7-2	I can use the properties of exponents to write and solve equations.	T 7-2 Retake Worksheet Solve and Writing Exponential Equations
T 7-3	I can use the properties of logarithms to write and solve equations.	T 7-3 Retake Worksheet Solving Logarithmic Equations
T 7-4	I can use the properties of exponents and logarithms to write and solve equations and apply them to real world scenarios.	T 7-4 Retake Worksheet

Rubber Band Launch



Your Mission:

Launch an object into the air and try to create the smallest standard deviation possible.

- You must launch the same object 8 times (3 trials).
- You may launch the object in any way possible – but the same way each time.
- You may launch any object you desire – take care in choosing the object as you have to launch it 24 times total.
- Objects must launch a minimum 100 centimeters each time!
- Distances must be measured in centimeters.
- Restrictions: We will be launching in the auxiliary gym. Therefore you have a height restriction and the object cannot cause damage to the gym floor. Launching should be school appropriate and safe.

After launching your object you must:

- Measure and record the distance from launch site to the objects.
- Calculate the standard deviation. (5pts)
- Calculate the Measures of Central Tendency. (5pts)
- Calculate the 5-number Summary and Create a Box and Whisker Plot. (5pts)
- Each person must break down and explain (in his or her own words) what all of the measurements that were calculated mean for your data. What relevant information does it give us about what you launched and how you launched it?

You must work with a partner or be a group of 3 maximum! However, everyone must participate in the launching process. Be sure to think of a way to stay consistent among all the players.

All ideas must be presented to Ms. Mahony in written form by

B-Day: Friday March 21st or Tuesday April 1st.

A-Day: Monday March 31st or Wednesday April 2nd.

We will be launching on

B-Day Thursday April 3rd in the auxiliary gym.

A-Day Friday April 4th in the auxiliary gym.

We will finishing our calculations on

B-Day: Monday April 7th

A-Day: Tuesday April 8th

Good luck to all of you!

Mahony

CRITERIA	UNSATISFACTORY 2/3 (Below Performance Standards)	PROFICIENT 4/5 (Minimal Criteria)	ADVANCED 6 (Demonstrates Exceptional Performance)
Launch	<ul style="list-style-type: none"> • Failure to present material by Friday March 21st to Ms. Mahony. • Lacking materials when class started. • Failed some of the restrictions required of the auxiliary gym. • Objects unable to fly 100 cm. • Failure to complete all three trials. • Way of measuring was inaccurate. • Lack of player participation. 	<ul style="list-style-type: none"> • Ideas are presented to Ms. Mahony by April 1st/2nd ! • Came prepared to class with materials needed to launch objects. • Materials and ideas follow all restrictions for the auxiliary gym. • Objects must pass 100 centimeters each time or be relaunched. • All three trials were conducted. • Measurements are accurate. • All players participate in launching process. 	<p>In addition to meeting the PROFICIENT criteria....</p> <ul style="list-style-type: none"> • Create a launching device that clearly took a significant amount of time to create.
Measures of Central Tendency	<ul style="list-style-type: none"> • Failure to convert measurements to centimeters. • Some or all work missing. • Explanations based off of personal hunches and not justifiable reasons. 	<ul style="list-style-type: none"> • All measurements have been converted to centimeters. • Work must be shown for how each measure was found. • Each student provides explanations of what each Measure of Central Tendency tells us about the information. 	<p>In addition to meeting the PROFICIENT criteria...</p> <ul style="list-style-type: none"> • Present each trial as a stem and left plot. • Analysis on similarities and differences between each trial.
5# Summary and Box and Whisker Plot	<ul style="list-style-type: none"> • Failure to convert measurements to centimeters. • Some or all work missing. • Explanations based off of personal hunches and not justifiable reasons. • Box and Whisker Plot is graphed with an inappropriate scale or lacking labels. 	<ul style="list-style-type: none"> • All measurements have been converted into centimeters. • Work must be shown for how each measure was found. • Each student provides explanations of what each of the 5 numbers from the 5-number Summary tells us about the information. • Box and Whisker Plot was graphed on an appropriate scale and labeled accurately. 	<p>In addition to meeting the PROFICIENT criteria ...</p> <ul style="list-style-type: none"> • Material is presented in a different way. i.e. bar graph, line graph, frequency table or histogram.
Standard Deviation	<ul style="list-style-type: none"> • Failure to convert measurements to centimeters. • Some or all work missing. • Explanations based off of personal hunches and not justifiable reasons. • Lack of justification of their method or what they would do differently to lower the standard deviation. 	<ul style="list-style-type: none"> • All measurements have been converted into centimeters. • Work must be shown for how each measure was found. • Each student provides explanations of what the standard deviation tells us about the information. • Justification as to why you believe your method of launching was a good option. • Justification for what you would change next time to create a smaller standard deviation. 	<p>In addition to meeting the PROFICIENT criteria ...</p> <ul style="list-style-type: none"> • Trials show progress towards lowering the standard deviation of your launch distances.
Neatness (Counts for all categories.)	<ul style="list-style-type: none"> • Lack of neatness in project. 	<ul style="list-style-type: none"> • All work shown and turned in must be neat!! 	<ul style="list-style-type: none"> • Information is typed on a computer and organized appropriately.

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Stat 1: Measures of Central Tendency -- Mean, Median, Mode and Range

This section has information that you should have already seen a few times in your mathematical career. Mean, median, and mode are great ways to look at sets of information and compare groups of information together.

mean:

median:

mode:

range:

Although these vocabulary words should be familiar, we should practice how to find each. Let's look at a couple of examples.

Example: Ms. Lingle's first period class took a test and had the following scores:

81, 97, 92, 65, 77, 89, 84, 68, 74, 93, 91, 85, 79, 84, 86, 90, 91, 84, 78, and 80.

What were the mean, median, and mode for these test scores?

1. To find the mean, we add up all the numbers and divide by how many numbers there are in the set.

So the mean or average test score of this first period class is _____%.

2. To find the median, we have to list the numbers in order from smallest to largest and find the middle number. If there are two middle numbers, then you find the average of the two middle numbers by adding them together and dividing by two.

65, 68, 74, 77, 78, 79, 80, 81, 84, 84, 84, 85, 86, 89, 90, 91, 91, 92, 93, 97

So the median of this first period class is _____%.

3. To find the mode, we have to determine which number occurs the most often. If there are two numbers that occur the most, then the set is **bimodal**, or having two modes.

So the mode of this first period class is _____%.

4. One last piece that can be compared is the range. To find the range, we take the largest number and subtract the smallest number.

So the range of this first period class is _____%.

NOW YOU TRY!! Ms. Lingle's first period class took a test and had the following scores:

79, 95, 90, 63, 75, 87, 84, 66, 72, 91, 89, 85, 77, 84, 86, 88, 89, 84, 76, and 78.

What were the mean, median, and mode for these test scores?

1. To find the mean:

So the mean or average test score of this fourth period class is _____.

2. Find the median:

So the median of this fourth period class is _____.

3. Find the mode:

So the mode of this fourth period class is _____.

4. Find the Range:

So the range of this first period class is _____.

Now let's compare the information we found:

	Mean	Median	Mode	Range
1 st period				
4 th period				

Do you see anything interesting? Write a sentence about what you notice.

HOMEWORK Stat 1

Solve each problem, making sure to label your answers and round to the nearest tenth and showing your work.

1. Find the mean, median, mode, and range of each of the following sets.

a) 61, 75, 75, 63, 67, 72, 66, 81, 79, 62

b) 28, 12, 21, 19, 20, 18, 24, 28, 30, 25

c) 190, 182, 198, 187, 195, 181, 199, 192, 184, 148, 188, 197

2. Create a set of data that would have the following:

a) A mean of 18

b) A median of 50

c) A Mean of 25 and a Mode of 15

d) A range of 48 and a median of 27

3. Several seaside hotels were rated between "no stars" and "Five Stars" by the tourist board. The table below shows how many hotels got each number of stars.

Find the mean number of stars earned.

Stars	Frequency
0	2
1	6
2	8
3	3
4	0
5	1

4. Professor Baker and Doctor Cooper keep a record of their golf scores, as shown in the table below. Find the mean, median, mode and range of the Professors and Doctors golf scores. Make a comparison about what the Measures of Central Tendency tells us about the two sets of data.

Professor Baker	
Score	Frequency
70	3
71	4
72	4
73	4
74	3
75	2

Doctor Cooper	
Score	Frequency
68	3
70	4
72	3
74	5
77	3
79	2

5. A storeowner kept a tally of the sizes of suits purchased in her store. Which measure of central tendency should the storeowner use to describe the average size of suits sold?
6. A tally was made of the number of times each color of crayon was used by a kindergarten class. Which measure of central tendency should the teacher use to determine which color is the favorite color of her class?
7. The science test grades are posted. The class did very well. All students taking the test scored over 75. Unfortunately, 4 students were absent for the test and the computer listed their scores are 0 until the test is taken. Assuming that no score repeated more times than the 0's, what measure of central tendency would most likely give the best representation of this data.

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Stat 2: Box Plots and the 5-Number Summary

In Class Notes and Practice

In the last section we practiced finding the mean, median, mode, and range of a set of numbers. Another way to display information like a set of numbers is a box plot. You may have seen one of these before as well, but finding the 5-number summary can be tricky.

5-number summary:

minimum:

first quartile:

median:

third quartile:

maximum:

Outlier:

Let's look at the same example we looked at last class.

Example: Ms. Lingle's first period class took a test and had the following scores:

81, 97, 92, 58, 77, 89, 84, 60, 68, 93, 91, 85, 79, 84, 86, 90, 91, 84, 78, and 80.

What is the 5-number summary?

To find the 5-number summary, we need to start by putting the numbers in order from smallest to largest.

58, 60, 68, 77, 78, 79, 80, 81, 84, 84, 84, 85, 86, 89, 90, 91, 91, 92, 93, 97

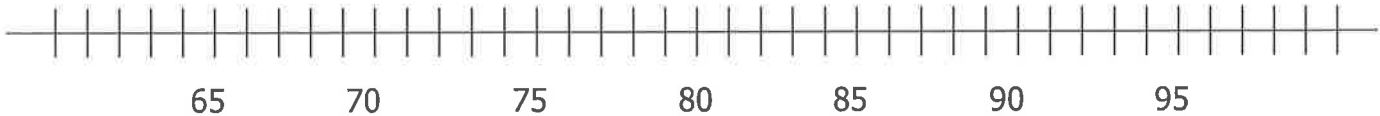
Find the Inter Quartile Range.

$$3^{\text{rd}} Q - 1^{\text{st}} Q =$$

$$1^{\text{st}} Q - \text{IQR} =$$

$$3^{\text{rd}} Q + \text{IQR} =$$

Now that we have our five number summary, we can create a box plot.

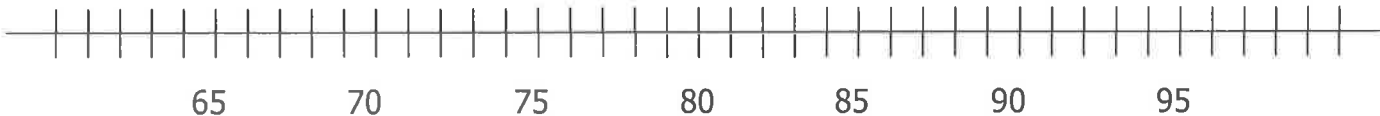


Now let's try to create our own on the second example.

Example: Ms. Lingle's first period class took a test and had the following scores:
79, 95, 90, 63, 75, 87, 84, 66, 72, 91, 89, 85, 77, 84, 86, 88, 89, 84, 76, and 78.

What is the 5-number summary?

Now that we have our five number summary, we can create a box plot.



Now let's compare the information we found:

	Minimum	1 st Quartile	Median	3 rd Quartile	Maximum
1 st period					
4 th period					

Do you see anything interesting? Have a quick conversation with a partner and write down your observations. Remember to use complete sentences!

Homework

1. Below are the prices of snowboards at two competing snowboard stores:

Middletown Snowboards
345, 350, 356, 360, 375, 405

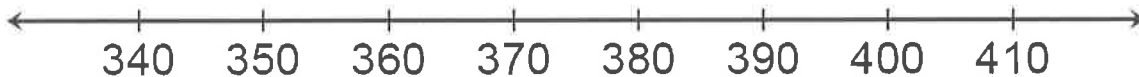
Snowboard Central
343, 370, 386, 392, 395, 402

a. Identify the 5# Summary of each set of data.

Middletown Snowboards

Snowboard Central

b. Draw a double box-and-whisker plot of the above data on the scale below:



- c. What is the median price for a snowboard at Middletown Snowboards?
- d. What is the lowest price you could pay for a snowboard at Snowboard Central?
- e. What is the most expensive board at Middletown Snowboards?
- f. What is the range of prices for snowboards at Snowboard Central?
- g. Which price represents the 3rd Quartile for Middletown Snowboards?
- h. Which store would you rather buy a snowboard from? Why?

2. The accompanying box-and-whisker plot represents the cost, in dollars, of twelve CD's.

a. Which cost is the 3rd quartile?

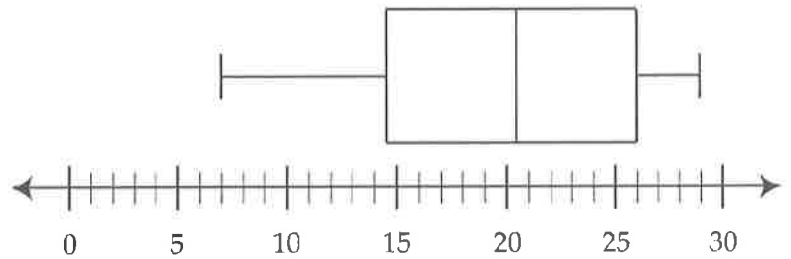
b. What is the range of the costs the CD's?

c. What is the median?

d. Which cost represents the maximum price?

e. How many CD's cost between \$14.50 and \$26.00?

f. How many CD's cost less than \$14.50?



of

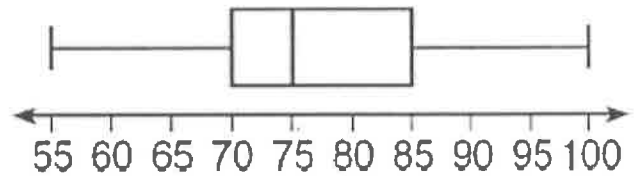
3. The accompanying box-and-whisker plot represents the scores earned on a math test.

a. What is the median score?

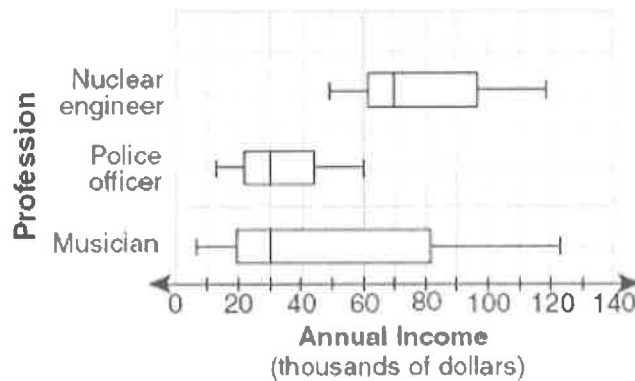
b. What score represents the first quartile?

c. How many scores represent 50% of the scores?

d. A score of an 85 on the box-and-whisker plot shown refers to what?



4. The accompanying box-and-whisker plots can be used to compare the annual incomes of three professions.



Based on the box-and-whisker plots determine whether each statement is true or false.

a. The median income for nuclear engineers is greater than the income of all musicians.

b. The median income for police officers and musicians is the same.

c. All nuclear engineers earn more than all police officers.

d. A musician will eventually earn more than a police officer.

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Stat 3: Standard Deviation

The standard deviation is used to tell how far on average any data point is from the mean. The smaller the standard deviation, the closer the scores are on average to the mean. When the standard deviation is large, the scores are more widely spread on average from the mean.

The **standard deviation** is calculated as the **average distance from the mean**.

Follow the steps below to calculate the standard deviation **by hand**.

Step 1: List the scores in the first column *Scores*, in the table below.

Step 2: Find the mean of the *Scores*.

Step 3: Subtract each of the scores from the mean. Record the difference in the *Difference From The Mean* column in the table below. Be sure to record whether the answer is positive or negative. (i.e.: $4-5=-1, 7-5=2$)

Step 4: Find the square of each number in the *Difference From The Mean* column and record the result in the *Square of the Difference* column (i.e.: $(-1)^2 = 1$)

Step 5: Find the sum of the numbers in the *Square of the Difference* and record your answer in the table.

Step 6: Take the Sum of the $(\text{Difference from the Mean})^2$ and divide it by n , one less than the amount of scores you have in your data set. Record your answer.

Step 7: The square root of step 6 is the standard deviation. Record your answer below:

Example:

The junior high basketball team played ten games. Find the standard deviation for the number of baskets scored by the team for the ten games:

8, 4, 6, 6, 7, 7, 9, 4, 8, 5

Score	Difference from the mean	(Difference from the mean) ²
8		
4		
6		
6		
7		
9		
4		
8		
5		
	Sum of (Diff.from the mean)²	
	Divide Sum by 1 less than the number of data values	
	Square Root your number to get your standard deviation	

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Standard deviation $\left(\sqrt{\frac{\text{diff. from Mean}^2}{n}}\right)$ is _____

Means?

Calculator Steps:

Step 1: Press 2nd and List (Stat button)

Step 2: Over Arrow to get to MATH

Step 3: Select 7:stdDev(

Step 4: Enter data with in brackets and separate with commas. (To get bracket press 2nd and parenthesis.)
i.e. stdDev({8, 4, 6, 6, 7, 9, 4, 8, 5})

Practice Problem

Find the standard deviation for the following test scores. Use the chart below to record the steps.
85, 100, 92, 96, 87, 94

Score	Difference from the mean	(Difference from the mean) ²
	Sum of (Diff.from the mean)²	
	Divide Sum by 1 less than the number of data values	
	Square Root your number to get your standard deviation	

Standard deviation $\left(\sqrt{\frac{\text{diff. from Mean}^2}{n}}\right)$ is _____

Explain what this means:

Homework Stat 3

Find the standard deviation for each problem below on the calculator. Round your answers to the nearest hundredth.

1. Josh wanted to test his vertical jump. Each day he jumped and recorded his height.
22, 18, 19, 25, 27, 21, 24

What does the standard deviation mean?

2. Sam was playing flappy bird. These are her scores from her 8 attempts to beat her highest score.
38, 46, 37, 42, 39, 40, 48, 42

What does the standard deviation mean?

Find the standard deviation for each problem below by hand. Show all work for credit!! Round your answers to the nearest hundredth. Explain what the standard deviation means.

3. The data represents the amount of time(minutes) that someone waited from their lunch at taco bell.
8.4, 7.7, 8.6, 7.5, 8.9, 7.8, 8.6, 9.1, 8.0

4. The data represents the weight of Jacksons lunch for a week.
1.25, 3.69, 5.67, 4.89, 0.12, 4.35, 2.78

5. Represents the amount of calories James burnt during each workout.
515, 720, 635, 895, 585, 690, 770, 840

6. The data represents the cost of an iPod at different electronic stores.
116, 105, 117, 124, 107, 112, 117, 125, 110, 113

Launching Contest

Name:

Record Sheet

Trial 1

Toss #	Distance (cm)	Variance (Distance -Mean)	Variance Squared (Distance-Mean) ²
1			
2			
3			
4			
5			
6			
7			
8			
Mean			
Total/8			
Total Variance Squared			
Divide by (n-1)			
Take the square root			

Item launched:

Way it was launched:

Launching Contest

Trial 2

Toss #	Distance (cm)
1	
2	
3	
4	
5	
6	
7	
8	
Standard Deviation with calculator	

Trial 3

Toss #	Distance (cm)
1	
2	
3	
4	
5	
6	
7	
8	
Standard Deviation with calculator	

1. What strategies did your team use?
2. How would you advise other students to compete next year?
3. Do you think your group's standard deviation is bigger or smaller than the rest of the class as a whole? Make a prediction of the lowest and highest standard deviations for the class.